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Canada's Beveridge curve and the outlook for the labour market

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Summary and key messages

Canada's labour market is tight, and demand for labour far exceeds the supply of workers. Job vacancies reached record highs in mid-2022, while unemployment reached record lows (**Chart 1**). The labour market is expected to cool in response to higher interest rates, and there have been signs in recent months that demand for labour is easing. A key question is, how much could the unemployment rate increase if labour demand falls back to pre-pandemic levels? To answer this question, we examine the inverse relationship between job vacancies and unemployment, known as the Beveridge curve.

In this note, we detail the theory of job matching that underpins the Beveridge curve and estimate fitted curves using Canadian data. We also analyze the factors that shift the Beveridge curve and provide scenarios for the Canadian labour market based on the fitted Beveridge curves.

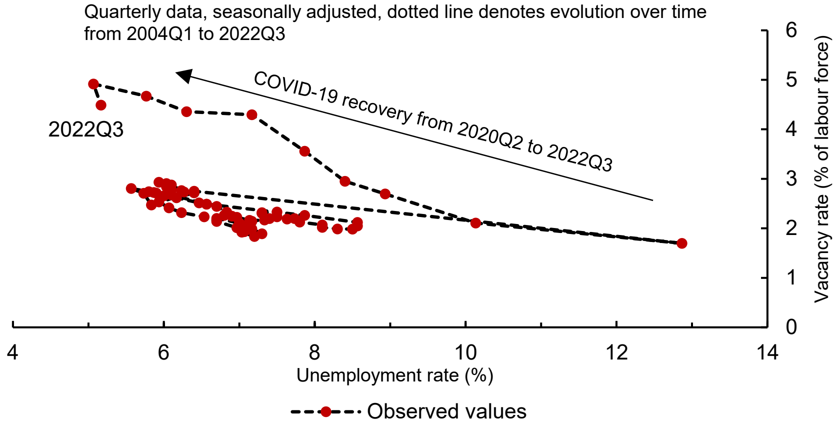
The key messages are:

- We find that the Canadian Beveridge curve shifted out during the COVID-19 pandemic, indicating a higher unemployment rate for any given level of job vacancies. However, recent data suggest that this shift has largely reversed.
- Given current labour market conditions, labour demand could cool while causing a rise, but not a surge, in unemployment.[1] In our base case, a return of job vacancies to normal levels is associated with an increase in the unemployment rate of around 1.5 percentage points (pp). This increase is material, particularly for those directly impacted, but far below what has historically been observed during recessions.

[1] In the United States, where Beveridge curve dynamics have been similar to those in Canada during the pandemic, Blanchard, Domash and Summers (2022a, 2022b) and Figura and Waller (2022) debate the persistence of Beveridge curve shifts and the corresponding likelihood of large increases in unemployment. This note aims to provide a similar analysis in the Canadian context.

Chart 1: Unprecedented tightness in labour markets, but demand starting to ease

Quarterly data, seasonally adjusted, dotted line denotes evolution over time from 2004Q1 to 2022Q3



Sources: Indeed, Canadian Federation of Independent Business, Statistics Canada and Bank of Canada calculations

Last observation: 2022Q3

Theoretical framework and methodology

Theories of job matching: An overview

The Beveridge curve is a visual representation of job matching in the labour market. Theories of job matching link the relationship between vacancies and unemployment to labour market flows, also known as job churn. We begin with the following hiring function:

$$H = a\,V^{\sigma}U^{1-\sigma}, 0 < \sigma < 1, \quad (1)$$

where H is total hiring in the economy, V is the level of job vacancies and U is unemployment. The variable a is matching efficiency, which is a measure of the effectiveness in forming hires by matching job seekers to available positions.

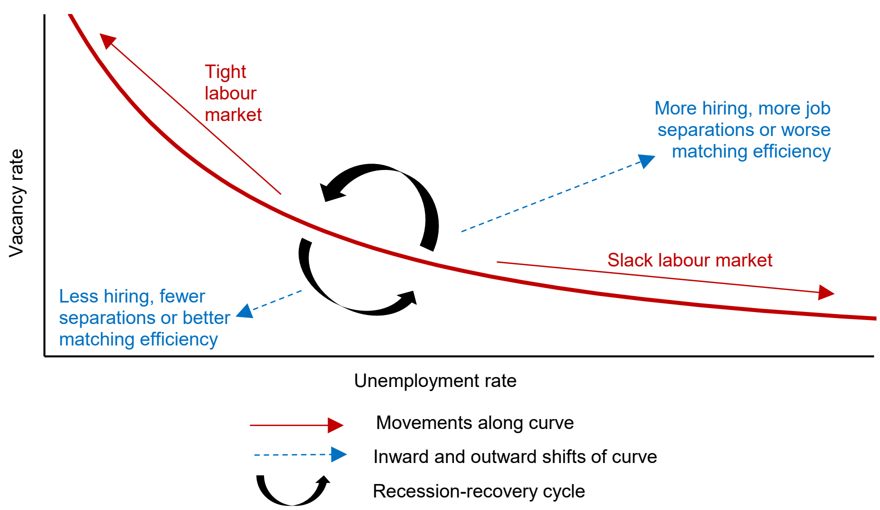
Equation (1) determines the shape and position of the Beveridge curve (**Chart 2**). Trade-offs in V and U, holding all else equal, correspond to movements along the Beveridge curve and generally reflect changes in labour market tightness or slack for a given level of job churn. A higher value of σ implies a flatter slope of the Beveridge curve, meaning that unemployment will increase by a larger amount in response to a given decrease in job vacancies.[2] Additionally, the Cobb-Douglas functional form implies that the trade-off between vacancies and unemployment is smaller when the vacancy rate is high, and vice versa.

In contrast to movements along the curve, the entire Beveridge curve may also shift. Such shifts inform whether a given easing in labour demand (vacancies) will correspond to a larger or smaller increase in the unemployment rate. The following cyclical and structural factors may drive outward shifts in the Beveridge curve:

[2] Based on equation (1), the slope of the Beveridge curve is equal to $-\frac{1-\sigma}{\sigma}$ when vacancies and unemployment are expressed in logs.

- *Job churn increases.* Flows into and out of employment and unemployment fluctuate during recession-recovery cycles. Job separations that lead to unemployment tend to rise at the beginning of a recession, and then hiring tends to recover faster than unemployment in the initial stages of recovery, pushing the Beveridge curve out. As the recovery continues, unemployment eases with a lag and hiring slows, pushing the Beveridge curve back in. These cyclical shifts, combined with movements along the curve from a slack to a tight labour market, create counterclockwise Beveridge "loops" that are shown by the black arrows in **Chart 2**.[3]
- *Matching efficiency, a, worsens.* In theory, matching efficiency reflects more structural characteristics. For example, matching may become less efficient on the supply side if the unemployed do not search for jobs as intensively or have been out of work for longer than usual, or on the demand side if business competitiveness declines or if hiring standards increase. Institutional changes, such as changes to employer protections or unemployment benefits, may also affect job-matching efficiency.[4]

Chart 2: Beveridge curve framework



The Beveridge curve is always shifting because hiring, separations and matching efficiency are always changing. Every observed point of job vacancies and unemployment sits on its own Beveridge curve, informed by the magnitude of job churn and matching efficiency in that period. However, we cannot estimate these Beveridge curve snapshots by simply fitting equation (1) to data on the headline unemployment rate because the rate itself reflects changes in churn over time.

[3] For more information, see Blanchard and Diamond (1989), Ahn and Crane (2020) and Lubik (2021). For a Canadian example, refer to Archambault and Fortin (2001).

[4] For supply-side examples, see Barnichon and Figura (2015). For demand-side examples, see Acharya and Wee (2020). Much of the literature on the determinants of job-matching efficiency focuses on the characteristics of job seekers rather than on firms or institutional frameworks, likely because of data constraints.

To identify snapshots of the Beveridge curve for any period, we need counterfactual measures of what the unemployment rate may have been over time given the degree of churn in that period. We start by expressing changes in unemployment as a function of various job churn measures:

$$\Delta U_{t+1} = \left[r_{EU,t+1}E_t + r_{NU,t+1}N_t\right] - \left[r_{UE,t+1}U_t + r_{UN,t+1}U_t\right]. \quad (2)$$

The change in unemployment in any given period is equal to flows into unemployment from both employment and inactivity, minus flows out of unemployment. The variable r is the transition rate into and out of employment (E), unemployment (U) or inactivity (N) from period t to $t+1$. We then calculate the steady-state solution for equation (2), normalize all levels as a share of the labour force and rearrange in terms of U: [5]

$$u_t = \frac{r_{EU,t+1}}{r_{EU,t+1}+r_{UE,t+1}+r_{UN,t+1}} + n_t \frac{r_{NU,t+1}}{r_{EU,t+1}+r_{UE,t+1}+r_{UN,t+1}}, \quad (3)$$

where u is the counterfactual unemployment rate. The identity n captures the relative population of non-participants in the economy and is similar in concept to the dependency ratio. We can then hold fixed as desired any of the job churn measures in equation (3) and generate counterfactual values of u. For this analysis, the separations rate is the variable of interest that will be held fixed.

Estimation

To fit the Beveridge curve to Canadian data, we rearrange and express equation (1) in dynamic terms:

$$\frac{H_{t+1}}{U_t} = \alpha_{t+1} \left(\frac{V_t}{U_t}\right)^{\sigma}, \quad (4)$$

where $\frac{H_{t+1}}{U_t}$ is the ratio of gross hiring to unemployment and $\frac{V_t}{U_t}$ is the ratio of vacancies to unemployment. As is standard in the job-matching literature, equation (4) can then be estimated in a log regression where α_{t+1} is informed by the constant term and estimated residuals. We estimate this equation using least squares based on monthly data from March 2011 to December 2019.

To capture snapshots of the Beveridge curve at key points in history, we estimate equation (4) using the counterfactual unemployment rate method based on equation (3). We calculate counterfactuals while holding job separations fixed at several key historical points.

[5] Because the flows into and out of unemployment are large in any given period, the steady-state measure of the unemployment rate generally tracks closely with the actual unemployment rate. Staff calculations suggest the correlation between the two measures is 0.90 over the estimation sample. Therefore, assuming a steady-state identity in our counterfactual unemployment rate measures is reasonable. For more information, see Figura and Waller (2022).

Data sources

Data on hiring come from Statistics Canada's monthly Labour Force Survey (LFS). We use custom tabulations of job-churn rates to construct a measure of gross hiring:[6]

$$H_{t+1} = r_{UE,t+1}U_t + r_{NE,t+1}N_t + jc_{t+1}[E_{t+1} - r_{UE,t+1}U_t - r_{NE,t+1}N_t], \quad (5)$$

where r is the transition rate into employment (E) from unemployment (U) or inactivity (N), from period t to $t+1$; and jc is the job-changing rate among those who were employed in both periods. In other words, we calculate gross hires by adding job changers to flows into employment from unemployment and inactivity.

Data on unemployment also come from the LFS for both the headline measure and the counterfactual measures based on job-churn rates.[7]

In terms of data on job vacancies, a long time series is not available for Canada. So we create a series that combines preliminary monthly estimates of vacancies from the Job Vacancy and Wage Survey (JVWS), high-frequency data on online job postings from Indeed and discontinued vacancies data from the Survey of Employment, Payrolls and Hours (SEPH).[8] Further details are available in **Appendix A**.

Results

Estimating the shape and position of the Beveridge curve

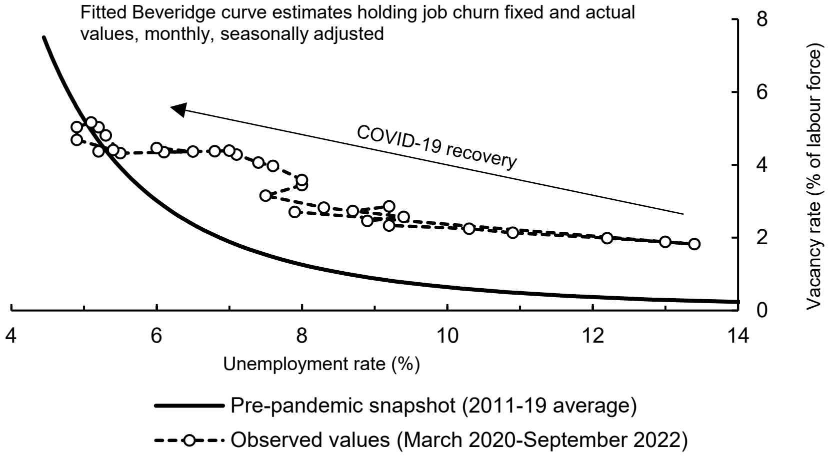
Regression results underpinning these Beveridge curve estimates can be found in **Appendix B**.

Chart 3 shows a snapshot estimate of the Beveridge curve for average conditions over the 2011–19 estimation sample overlaid with actual observations of the vacancy and unemployment rates since March 2020. The estimated slope of this Beveridge curve is indeed relatively steep at high vacancy rates. This suggests that vacancies could come down without strong trade-offs in higher unemployment, all else being equal.

Moreover, additional Beveridge curve snapshot estimates show that the Beveridge curve shift has almost completely reversed from the height of the pandemic (**Chart 4**).

[6] For more information on how the job-churn rates are constructed, please see Kostyshyna and Luu (2019).
[7] Monthly data from the LFS are up to and include September 2022.
[8] Monthly SEPH data on vacancies begin in March 2011, which informs our regression estimation sample. We also extend our vacancies series further back, but at a quarterly instead of a monthly frequency, to the first quarter of 2004 using data on vacancies from the Canadian Federation of Independent Business.

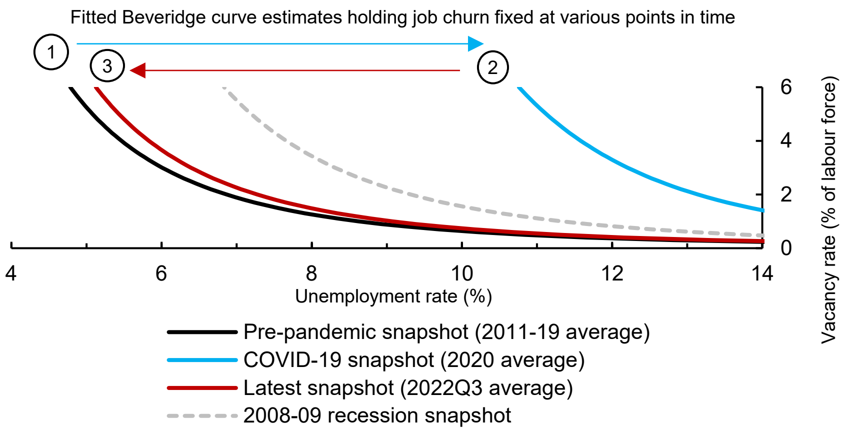
Chart 3: Labour market is now near pre-pandemic Beveridge curve



Sources: Statistics Canada and Bank of Canada calculations

Last observation: September 2022

Chart 4: Beveridge curve shift has almost fully reversed



Note: Arrows denote shifts in the Beveridge curve from point (1) to point (2) at the start of the COVID-19 pandemic, and then point (2) to point (3) during the subsequent recovery.

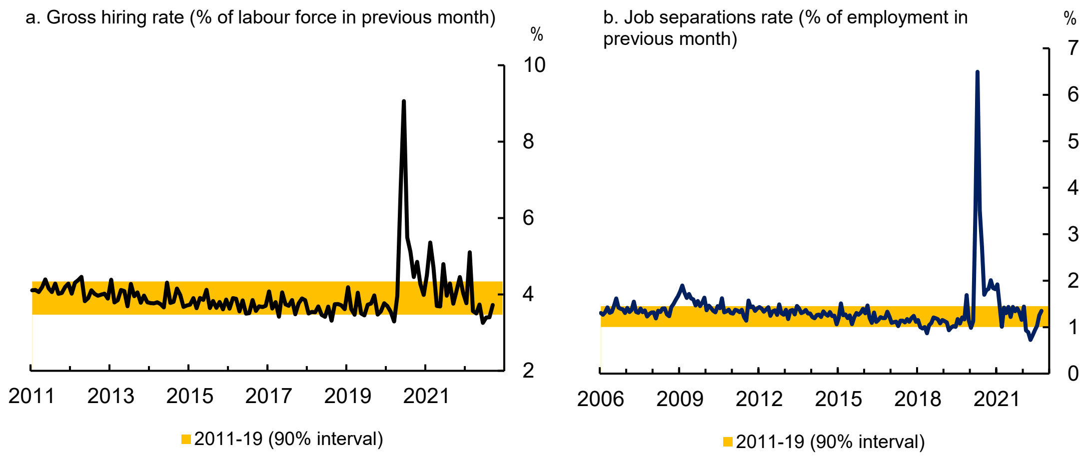
Sources: Statistics Canada and Bank of Canada calculations

Decomposing shifts in the Beveridge curve: Job churn

We now examine the role that various factors played in shifting the Beveridge curve outward and then back in over the course of the pandemic.

Unprecedented amounts of job churn drove most of the initial outward shift in the Beveridge curve during the pandemic (**Chart 5**). This essentially reflected an extreme version of the cyclical Beveridge loops discussed previously: job separations leading to unemployment spiked in April 2020 amid mass layoffs and lockdowns for most of the Canadian economy, and then hiring recovered very quickly before peaking in June 2020. Job churn remained slightly elevated until early 2022, reflecting subsequent pandemic waves, lockdowns and reopenings. Hiring and separations largely normalized in the spring of 2022—and in fact briefly fell below pre-pandemic averages. These dynamics are consistent with the near-total reversal of the outward shift in the Beveridge curve.[9]

Chart 5: Hiring and job separations rates have normalized



Sources: Statistics Canada and Bank of Canada calculations

Last observation: September 2022

Decomposing shifts in the Beveridge curve: Matching efficiency

Estimates of matching efficiency were extremely high at the beginning of the pandemic (**Chart 6**), partly offsetting the outward shift in the Beveridge curve caused by greater job churn (without this offset, the shift would have been even more pronounced). High matching efficiency reflected the rapid recovery in the labour market following the initial shock from the pandemic. The large share of temporary layoffs also likely helped matching efficiency during the pandemic. These workers maintained a connection to their last employers and were able to return quickly to their jobs. Matching efficiency similarly spiked during the reopening phases that followed subsequent lockdowns.

However, matching efficiency worsened and fell below pre-pandemic levels over the first half of 2022, recovering only in September. The standard structural factors that usually determine matching efficiency did not appear to be behind this decline, such as the characteristics of the unemployed. For example, the number of long-term unemployed workers has largely normalized and is down to pre-pandemic levels.

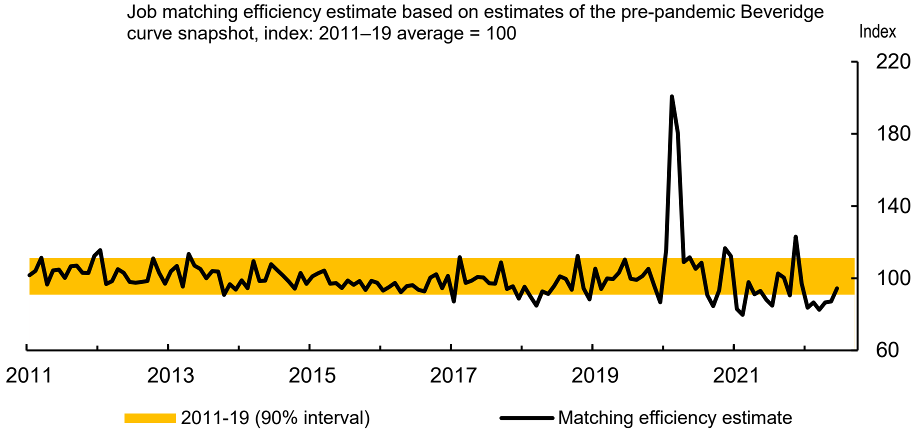
Instead, the decline likely reflected acute labour shortages seen over the summer as firms faced difficulties meeting their hiring needs amid historically strong demand for workers and

[9] The pattern of normalization in hiring and separations following the beginning of the pandemic was broad-based across industries, suggesting that economy-wide trends rather than reallocation across sectors drove aggregate dynamics. That said, job separation and hiring rates were unsurprisingly more volatile and structurally higher in hard-to-distance service sectors.

elevated job vacancies.[10] Matching efficiency should remain around recent pre-pandemic averages assuming that the demand for labour continues to ease back in line with supply.

Chart 6: Estimates of matching efficiency near pre-pandemic averages

Job matching efficiency estimate based on estimates of the pre-pandemic Beveridge curve snapshot, index: 2011–19 average = 100



Note: Estimate is based on the constant and residual terms of a standard hiring function regression, estimated in logs.

Sources: Statistics Canada and Bank of Canada calculations

Last observation: September 2022

Scenario analysis

The normalization of job churn and a recent improvement in estimates of matching efficiency reinforce that the Beveridge curve has largely returned to its pre-pandemic position. Of course, there is a risk that the Beveridge curve could shift outward again. This is especially the case if job separations pick up with a slowing economy, or if recent improvements in matching efficiency relative to earlier in 2022 reverse. This section constructs scenarios showing how high the unemployment rate could rise, depending on how job churn and matching efficiency evolve.

In addition to the scenarios based on Beveridge curve snapshot estimates, we also estimate equation (4) using the actual unemployment rate rather than the counterfactual measure over the 2011–19 sample. This specification allows job separations to fluctuate over time. It is useful because we can allow the separations rate to be informed endogenously by the data in the estimation sample (i.e., unemployment rate predictions reflect the underlying, historical relationship between separations and unemployment) rather than being determined arbitrarily.[11, 12]

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[10] For more information, see the Bank of Canada’s Business Outlook Survey for the first, second and third quarters of 2022.

[11] Within the estimation sample, the separations rate ranges from 0.9% to 1.7%. For reference, this rate reached 1.9% at the peak of the 2008–09 global financial crisis and 6.5% at the height of the COVID-19 pandemic.

[12] The slope of this equation specification using the actual unemployment rate (based on the estimate for σ) should be flatter than suggested by the earlier snapshot estimates because changes in unemployment arising from changes in separations are now captured in points along the curve. Essentially, the estimated Beveridge curve arising from this specification can be thought of as a horizontal aggregation of all the period-specific Beveridge curve snapshots over the estimation sample. Estimation results for this specification are also found in **Appendix B**.

Table 1 and **Chart 7** show selected scenarios along several hypothetical Beveridge curves, from most to least optimistic. Note that these capture what could occur, whereas the curves shown earlier depicted what has already occurred:

- In scenario 1, we assume that matching efficiency remains around its sample average. We fix the job separations rate at its 2019 average of 1.1%, which is below the overall sample average of 1.2%. This results in an increase of 1.4 pp in the unemployment rate to 6.3%, which is similar to levels in 2017–18.
- In scenario 2, we assume that matching efficiency remains around its sample average, and we allow separations to vary endogenously by estimating the Beveridge curve using the actual unemployment rate. The corresponding separations rate peaks around 1.3%, which is in the 68th percentile of the estimation sample. The unemployment rate increases 1.8 pp to 6.7%, a larger increase but still well below typical increases and peak unemployment rates associated with recessions. We view this as the most likely scenario.
- In scenario 3, we also allow separations to fluctuate. However, we assume that matching efficiency worsens back to the lows seen earlier in 2022. The corresponding separations rate peaks at around 1.8%, slightly above the estimation sample range but below highs from the 2008–09 recession. The unemployment rate rises to 8.4% (an increase of 3.5 pp).
- In scenario 4, we assume that matching efficiency worsens, and we also fix the job separations rate at its peak of 1.9% from the 2008–09 recession. The resulting unemployment rate rises to 9.7% (an increase of 4.8 pp), exceeding what was seen during 2008–09. This result can be considered a more extreme scenario for the labour market.

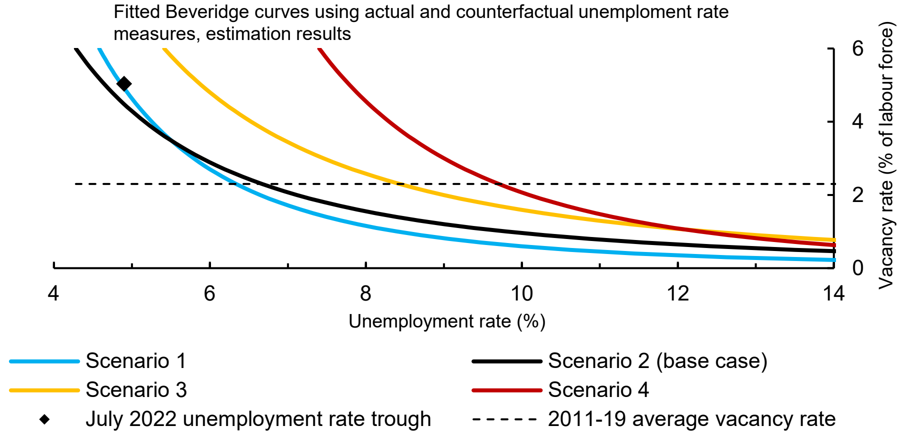
Table 1: Beveridge curve scenario analysis and historical downturns

	Trough (%)	Increase (pp)	Peak (%)
Beveridge curve scenarios			
Scenario 1	4.9	1.4 →	6.3
Scenario 2 (base case)	4.9	1.8 →	6.7
Scenario 3	4.9	3.5 →	8.4
Scenario 4	4.9	4.8 →	9.7
Historical slowdowns			
2014 oil price shock	6.7	0.6 →	7.3
2008–09 recession	5.9	2.8 →	8.7
1990–91 recession	7.2	4.9 →	12.1
1981–82 recession	7.0	6.1 →	13.1

Note: The 2014 oil price shock saw economic growth slow in Canada, but it was not considered to be a recession.
Sources: Statistics Canada and Bank of Canada calculations

Chart 7: Modest rise in unemployment rate most likely, but harder landing may also occur

Fitted Beveridge curves using actual and counterfactual unemploment rate measures, estimation results



Sources: Statistics Canada and Bank of Canada calculations

These scenarios should be considered points along a spectrum of possibilities. One additional possibility is that the vacancy rate remains higher than historical averages even during a downturn in demand (for example, if labour shortages persist due to retirements). Another is that the vacancy rate falls even further, eliciting further movements along the various Beveridge curve estimates. A more detailed table of outcomes is available in **Appendix C**.

Our analysis does not explicitly estimate probabilities for various scenarios as this is outside the scope of the Beveridge curve framework. While global shocks or other events could lead to worse outcomes for the labour market, we nonetheless see several reasons why scenario 2 is most likely:

- Job churn and matching efficiency have normalized, leaving the labour market in a healthy position in the Beveridge curve space.
- Labour shortages have been widespread and binding for many firms, in part due to greater replacement needs amid the recent increase in retirements (**Chart 8**). In this context, firms may be less likely to lay off remaining workers and job separations leading to unemployment may remain lower, preventing the Beveridge curve from shifting out as much as it usually might have from a cyclical downturn in labour demand.
- We believe this scenario reasonably captures some of the cyclical Beveridge curve dynamics common in an economic slowdown because the scenario still incorporates some increase in the separations rate (in line with the rate's natural relationship with unemployment over the estimation sample).

Chart 8: Job separations may remain low as retirements increase and replacement needs rise

Share of population who left their job in the last 12 months due to retirement, seasonally adjusted

Sources: Statistics Canada and Bank of Canada calculations

Last observation: September 2022

Appendix A: Creating a longer time series for job vacancies

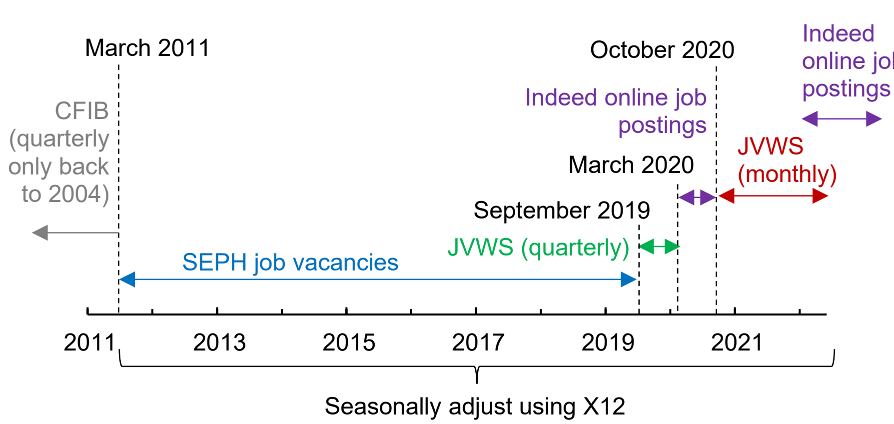
A long, ongoing, monthly time series on job vacancies is not available for Canada. For the purposes of our analysis, we combine measures of job vacancies from several sources (**Table A-1**, **Chart A-1**). Our primary source of data is Statistics Canada's Job Vacancy and Wage Survey (JVWS).

For periods where monthly JVWS data are unavailable but quarterly data are available (September 2019 to March 2020), we grow out monthly values using year-to-year changes in quarterly job vacancies. For periods where neither are available (April to September 2020, August and September 2022), we interpolate values based on online job posting data from Indeed. Finally, as the spliced vacancies series is not seasonally adjusted, we seasonally adjust over the entire data series using an X12 process.

Table A-1: Data sources for job vacancies

Source	Frequency	Notes
Indeed online job postings	Daily (January 2018–present)	Not seasonally adjusted; monthly averages used
Job Vacancy and Wage Survey (JVWS): Preliminary release	Monthly (October 2020–present)	Not seasonally adjusted
JVWS: Final release	Quarterly (2015Q1–present)	Not seasonally adjusted; no data from 2020Q2–2020Q3
Survey of Employment, Payrolls and Hours	Monthly (March 2011–August 2019)	Not seasonally adjusted, 3-month moving average
Canadian Federation of Independent Business	Quarterly (2004Q1–2020Q2)	Seasonally adjusted, business sector only

Chart A-1: Combining measures of job vacancies



Note: CFIB is the Canadian Federation of Independent Business. SEPH is the Survey of Employment, Payrolls and Hours. JVWS is the Job Vacancy and Wage Survey.

Appendix B: Hiring function regression, estimation results

Table B-1: Beveridge curve: hiring function estimation results

Estimation method: Least squares (HAC standard errors)

Dependent variable: Log (hiring/unemployment)

Sample: March 2011–December 2019 (n = 106)

Job separations assumption:	Separations vary	Separations fixed at				
	(Actual UR)	2011–19 avg.	2019 avg.	2022Q3 avg.	2008–09 recession	COVID-19 peak
Constant	-0.22 (0.04)***	-0.29 (0.06)***	-0.25 (0.06)***	-0.31 (0.07)***	-0.46 (0.08)***	-1.19 (0.16)***
Log (vacancies/unemployment)	0.32 (0.04)***	0.25 (0.06)***	0.25 (0.05)***	0.24 (0.06)***	0.22 (0.06)***	0.15 (0.08)**
Adjusted R-squared	0.60	0.31	0.32	0.30	0.24	0.09

Note: The job separations assumption refers to the use of various counterfactual unemployment rates that hold the separations rate fixed. *** and ** denote statistical significance at the 1% and 5% levels, respectively.

Appendix C: Scenario analysis: Detailed prediction results

Table C-1: Predicted unemployment rates given changes in vacancies, matching efficiency and separations

		Job vacancy rate							
Matching efficiency	**Separations rate**	**4.5% (2022Q3 avg.)**		**2.7% (2019 avg.)**		**2.3% (2011–19 avg.)**		**2.0% (2008–09 recession)**	
2011–19 avg. (100%)	1.1% (2019 avg.)	4.8	(4.8–4.9)	6.0	(5.7–6.4)	6.3	(5.9–6.9)	6.6	(6.1–7.5)
	1.2% (2011–19 avg.)	5.0	(5.0–5.1)	6.2	(5.9–6.7)	6.6	(6.1–7.1)	6.9	(6.3–7.6)
	Not fixed (estimated using actual unemployment rate)	4.6	(4.6–4.6)	6.2	(5.9–6.5)	6.7	(6.3–7.1)	7.1	(6.7–7.7)
	1.9% (2008–09 recession low)	6.4	(6.3–6.5)	7.7	(7.1–8.4)	8.0	(7.3–8.9)	8.3	(7.5–9.4)
2022 low (85%)	1.1%	6.0	(5.9–6.1)	7.4	(6.9–8.0)	7.8	(7.2–8.6)	8.2	(7.3–8.6)
	1.2%	6.2	(6.1–6.3)	7.7	(7.1–8.3)	8.1	(7.4–8.9)	8.5	(7.7–9.5)
	Not fixed	5.8	(5.8–5.9)	7.8	(7.4–8.3)	8.4	(7.9–9.1)	9.0	(8.3–9.8)
	1.9%	7.8	(7.5–8.0)	9.3	(8.5–10.3)	9.7	(8.7–11.0)	10.1	(9.0–11.6)

Note: Estimates based on least squares regression of hiring function using actual and counterfactual unemployment rate measures (i.e., holding the job separations rate varied and fixed, respectively). Values in parentheses denote estimates based on the slope coefficient of the hiring function, plus or minus 1 standard error (Newey-West HAC standard errors).

References

Ahn, H. J. and L. D. Crane. 2020. "Dynamic Beveridge Curve Accounting." Federal Reserve Board of Governors Finance and Economics Discussion Series No. 2020-027.

Acharya, S. and S. L. Wee. 2020. "Rational Inattention in Hiring Decisions." *American Economic Journal: Macroeconomics* 12 (1): 1–40.

Archambault, R. and M. Fortin. 2001. "The Beveridge Curve and Unemployment Fluctuations in Canada." *The Canadian Journal of Economics* 34 (1): 58–81.

Barnichon, R. and A. Figura. 2015. "Labor Market Heterogeneity and the Aggregate Matching Function." *American Economic Journal: Macroeconomics* 7 (October): 222–49.

Blanchard, O., A. Domash, and L. H. Summers. 2022a. "Bad News for the Fed from the Beveridge Space." Peterson Institute for International Economics Policy Brief 22–7.

Blanchard, O., A. Domash, and L. H. Summers. 2022b. "The Fed Is Wrong: Lower Inflation Is Unlikely Without Raising Unemployment." Peterson Institute for International Economics (August 1).

Blanchard, O. and P. A. Diamond. 1989. "The Beveridge Curve." *Brookings Papers on Economic Activity* 1989-1: 1–76.

Figura, A. and C. Waller. 2022. "What Does the Beveridge Curve Tell Us About the Likelihood of a Soft Landing?" Board of Governors of the Federal Reserve System *FEDS Notes* (July 28).

Kostyshyna, O. and C. Luu. 2019. "The State of Labour Market Churn in Canada." Bank of Canada Staff Analytical Note No. 2019-4.